Input Binary Frequency Function Module

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Introduction

Description

The Input Binary Frequency (IBF) Function Module is a signal conditioning device that interfaces incoming field signals to the DCM. The IBF senses field data, available as rapidly cycling contact closures or input voltages, and converts the input frequency to a DC voltage for use by the DCM.

The IBF Function Module plugs into any of the top ten slots associated with the DCM. Figure 1 shows typical function module locations in the NCU. A five slot panel is pictured.

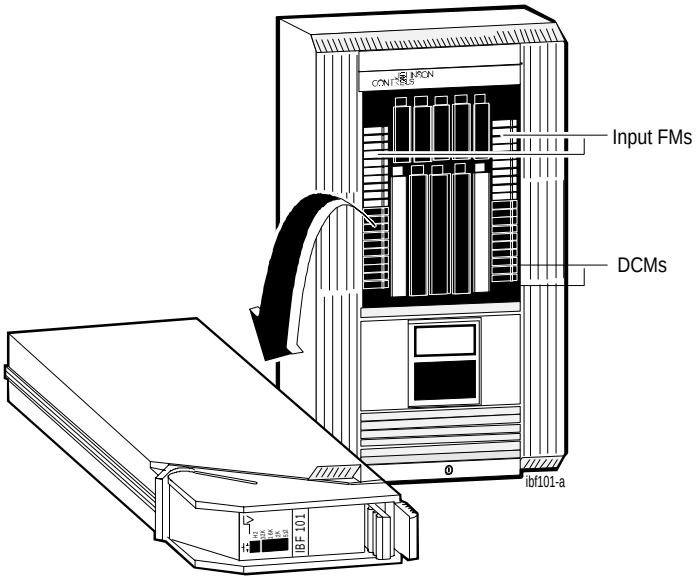


Figure 1: IBF Function Module Location

Application

The IBF Function Module is typically used with a flow transmitter that has a frequency output.

Capabilities

Table 1: Capabilities

Capability	Description	Purpose
Input from Field	Field device inputs a rapidly changing binary state. The state can be either: - Contacts (closed vs open) - Voltage (high vs low)	Provides interface of a rapidly cycling signal (a frequency signal) to the DCM.
Input Type Switch	A two position switch selects type of input: - Contacts (closed vs open) - Voltage (high vs low)	Module is easily configured for different input types.
Input Frequency Switch	Four 2-position switches select: - 1 to 512 Hz - 4 to 2047 Hz - 32 to 16383 Hz - 64 to 32767 Hz	Module is easily configured for different input frequency ranges.
Output to DCM	Module outputs DC voltage that is proportional to the input rate of change (frequency).	Provides direct, plug-in connection to the DCM.

Theory of Operation

The figure below is a simplified function diagram of the IBF Function Module.

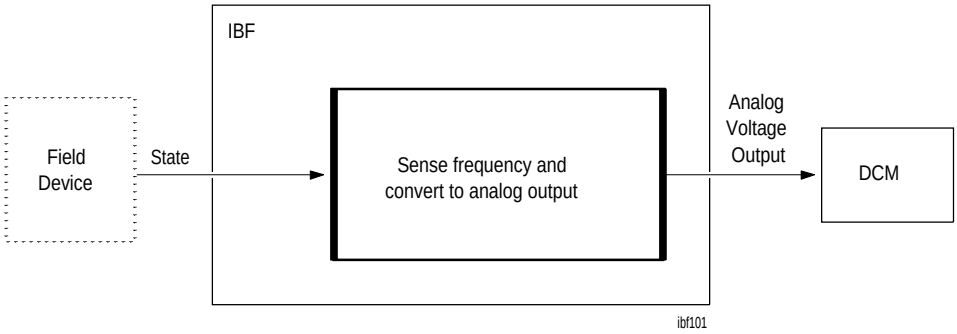


Figure 2: IBF Function Diagram

The process is:

- A field device provides an input signal to the IBF in the form of contact closures or high/low voltage cycles.
- Manual switch selections identify the type of input (high/low voltage or contact closures) and the frequency range of the input.
- Frequency circuitry in the IBF converts the input cycle rate or frequency into an analog voltage output.
- The DCM receives the signal and converts the analog voltage value to a digital value. This value is entered in the data file for the point object associated with the field device input.

Specifications

Table 2: Specifications

Category	Specifications For Configurations
Product Code Number	FM-IBF101
Input Range	64 Hz - 32767 Hz 32 Hz - 16383 Hz 4 Hz - 2047 Hz 1 Hz - 512 Hz
Input Threshold	High/low voltage mode ≥ 8 V for "ON" ≤ 2 V for "OFF" Contact closure mode ≤ 100K ohm for "ON" ≥800K ohm for "OFF"
Input Limits	Absolute maximum input voltage: 30 VDC or RMS (non-destructive)
Input Resistance	>330K ohm (differential) >165K ohm from each input to analog common
Input-Output Characteristics	Linear voltage output: from 0 to 10 VDC, proportional to input frequency. (Zero volt output at minimum frequency)
Output Range	0 to 10 VDC
Response Time	4 sec. (maximum) for full range input frequency step change
Resolution	1 Hz or 0.1%, whichever is greater, of full scale output
Accuracy	±0.5% of full scale output at 70 ±2°F (21 ± 1.1°C)
Stability	±1.0% of full scale deviation from original calibration for one year under normal operating conditions
Thermal Effects	±0.04% of full scale per °F for 32 to 122°F (±0.072% of full scale per °C for 0 to 50°C)
Humidity Effects	±0.02% of full scale output per % relative humidity for 10 to 90% relative humidity
Calibration	The module is factory calibrated.
Source Power	Power is from the DCM and NCU/NEU.
Operating Environmental Requirements	32 to 122°F (0 to 50°C) 10 to 90% noncondensing relative humidity 86°F (30°C) maximum dew point
Storage/Shipping Environmental Requirements	-40 to 158°F (-40 to 70°C) 5 to 95% noncondensing relative humidity 86°F (30°C) maximum dew point
Size	0.85 in. H x 2.6 in. W x 7.0 in. L (2.2 cm H x 6.6 cm W x 17.8 cm L)
Weight	0.5 lb. (0.22 kg)
Agency Compliance	FCC Part 15 Subpart J - Class A, UL 916, CSA C22.2 No. 205
Agency Listings	UL Listed and CSA Certified as part of Metasys®

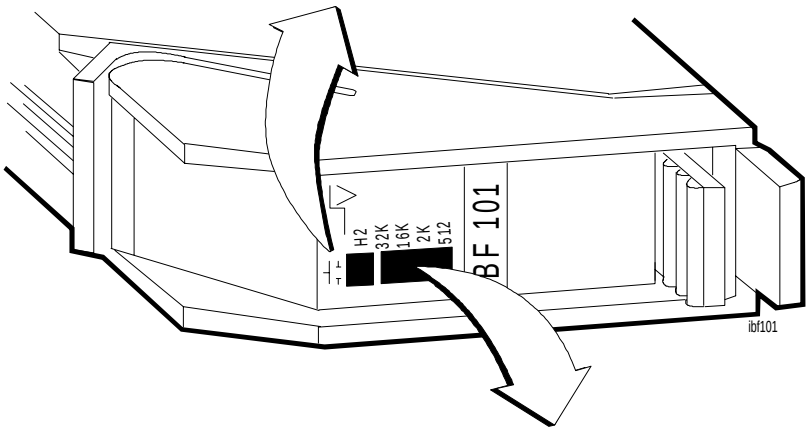
Installation Procedures

General Information

When installing and connecting function modules:

- follow NEC and local codes
- observe maximums as specified in the specification table and in these installation guidelines
- use switches on front of module to adjust for type of input. See figure below.

Input Type	Switch Setting
High/Low Voltage	
Contact Closures	



Input Frequency	Switch Setting
64 to 32767 HZ	32K
32 to 16383 HZ	16K
4 to 2047 HZ	2K
1 to 512 HZ	512

Figure 3: Switch Settings

Flow Meter

The figure below diagrams typical connections for a flow meter.

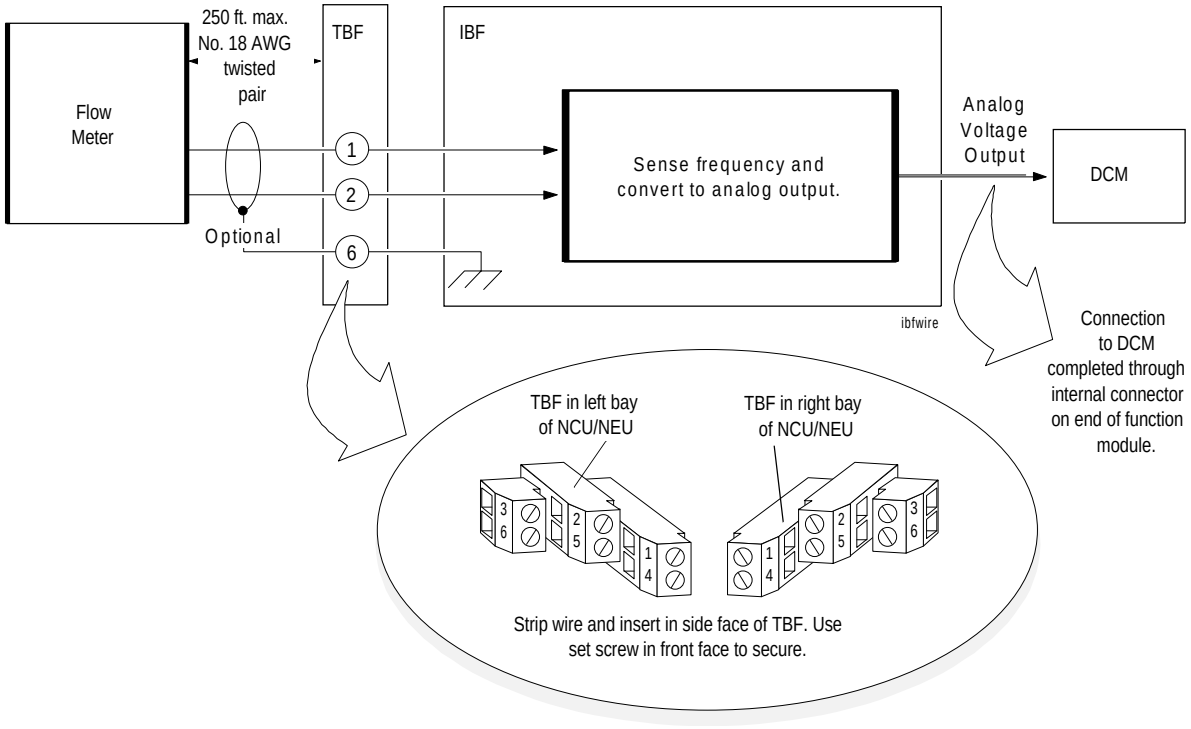


Figure 4: Connections for Flow Meter IBF Applications

Physical Installation

Assumptions

The following procedure for the physical installation of the Input Binary Frequency (IBF) Function Module assumes:

- NCU/NEU panel is installed.
- Connections to field devices are complete.
- You have engineering drawings defining details for the installation.
- You are familiar with Metasys Network terminology, and the location and operation of power switches.

Procedure

For each IBF Function Module in the network, perform the following steps.

1. Set Input Type switch for contact or voltage inputs. See *Specification* section for an explanation of switch selections.
2. Set appropriate input frequency switch for input frequency range. Make only one input frequency selection!
3. Refer to Figures 3 and 4 and identify the proper panel and slot number location for this module.
4. Open the latch and insert the module in the appropriate slot.
5. Close latch, locking function module in place.

Commissioning Procedures

Software Verification

Assumptions

The following procedure for the software verification of the IBF Function Module assumes:

- Physical installation at the NCU/NEU panel is complete, including NCM, DCM, FM, etc.
- The operating software for the network has been downloaded to the NCM controlling the panel.
- An Operator Workstation is available.

Procedure

For each IBF Function Module in the network, perform the following steps.

1. Select the System summary that includes this IBF object.
2. Verify that the point object defined in the System summary, the function module, and the field device are connected as defined by Figure 5. Correct if necessary.
3. Verify that the object's Value attribute (as seen in the summary) matches the actual value for the field device. Calibrate if necessary.
4. If calibration is required, adjust Linearization Parameter 1 up or down, as appropriate.
    a. Using the Focus window on an Operator Workstation, adjust Linearization Parameter 1 for proper calibration.
    b. Enter the new linearization parameter setting in the DDL or GPL source file.

Troubleshooting Procedures

Troubleshooting Chart

Using the diagram in Figure 5 (next page) as a troubleshooting guide. It applies for failures between point objects and field devices connected through an IBF Function Module.

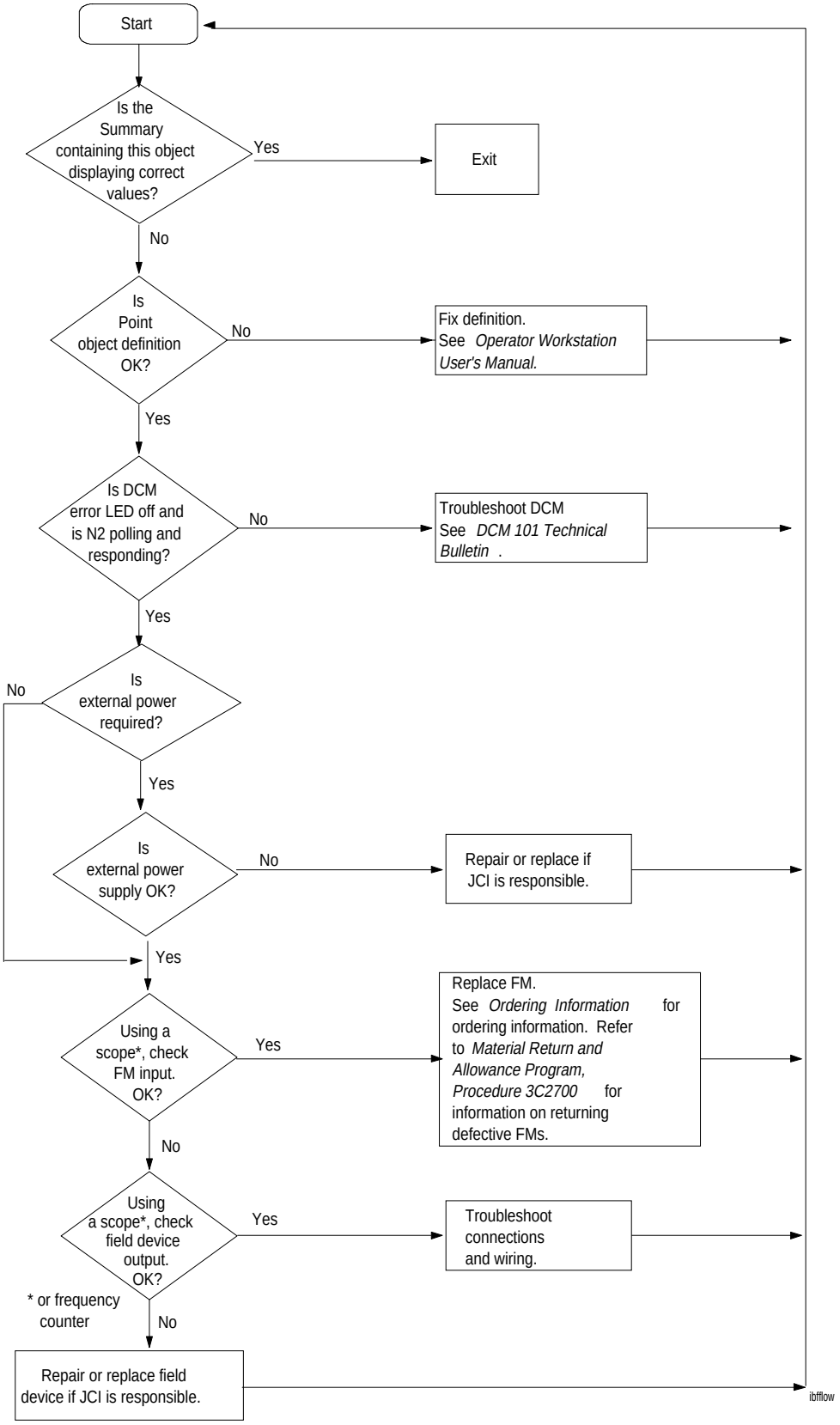

Start
Is the Summary containing this object displaying correct values?
Yes
Exit
No
Is Point object definition OK?
No
Fix definition. See Operator Workstation User's Manual.
Yes
Is DCM error LED off and is N2 polling and responding?
No
Troubleshoot DCM See DCM 101 Technical Bulletin .
Yes
Is external power required?
No
Yes
Is external power supply OK?
No
Repair or replace if JCI is responsible.
Yes
Using a scope*, check FM input. OK?
Yes
Replace FM. See Ordering Information for ordering information. Refer to Material Return and Allowance Program, Procedure 3C2700 for information on returning defective FMs.
No
Using a scope*, check field device output. OK?
Yes
Troubleshoot connections and wiring.
* or frequency counter
No
Repair or replace field device if JCI is responsible.
ibfflow

Figure 5: IBF Troubleshooting

Ordering Information

Table 3: Code Number

Description	Product Code Number
IBF Function Module	FM-IBF101-0

Notes

JOHNSON CONTROLS

Controls Group
507 E. Michigan Street
P.O. Box 423
Milwaukee, WI 53201

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